CLAIMS

1. A method for identifying diet-regulated disease-associated polynucleotides comprising the steps of:

(i) selecting at least two different inbred known genotypes (A and B), one of these genotypes (A) being more susceptible to a disease, and the other genotype (B) less susceptible to the same disease;

(ii) dividing each genotype into two groups (A1 and A2 and B1 and B2);

(iii) for each genotype, each group is fed a different diet (A1 is fed diet No.1 and A2 is fed diet No.2, and similarly for B1 and B2);

(iv)measuring gene expression and comparing expression across the strains that differ in either genotype or in diet, but not in both;

(v) analyzing the expression data so as to identify diet-regulated disease-associated genes.

2. The method of claim 1 further comprising comparing the diet-regulated disease-associated genes so identified with an independently-derived set of diet-regulated and/or disease associated QTLs.

3. The method of claim 1 wherein the disease is a diet-associated disease.

4. The method of claim 2 wherein gene expression is compared by comparing mRNA abundance.

5. A method for determining the susceptibility of an individual to a disease, wherein said disease involves a diet-regulated disease-associated polynucleotide, the method comprising: screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1, wherein the pattern of expression of said plurality of polynucleotides corresponds with the susceptibility of an individual to a certain disease.

6. A method for monitoring the progression of a disease in a subject, the method comprising: at a first date, screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1; at a second date re-screening the individual for the expression of the same plurality of polynucleotides, wherein a change in polynucleotide expression corresponds to the desirable or undesirable progression of a disease.

7. A method for treating a subject so as to reduce the risk of the individual developing a diet-associated disease, the method comprising: screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1, wherein the pattern of expression of said plurality of polynucleotides corresponds with the susceptibility of an individual to a certain disease; and altering the expression of one or more diet-regulated disease-associated polynucleotides to reduce the risk of the subject developing the disease.

8. A method for treating a subject so as to reduce the risk of the individual developing a diet-associated disease, the method comprising: screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1, wherein the pattern of expression of said plurality of polynucleotides corresponds with the susceptibility of an individual to a certain disease, and altering the diet of the individual so as to reduce the risk of the subject developing the disease.

9. A method for treating a subject so as to ameliorate a diet-associated disease, the method comprising: screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1, wherein the pattern of expression of said plurality of polynucleotides corresponds with the susceptibility of an individual to a certain disease; and altering the expression of one or more diet-regulated disease-associated polynucleotides so as to affect an improvement in the progression of the disease.

10. A method for treating a subject so as to reduce the risk of the individual developing a diet-associated disease, the method comprising: screening an individual for the presence and/or expression of a plurality of polynucleotides identified by the method of claim 1, wherein the pattern of expression of said plurality of polynucleotides corresponds with the susceptibility of an individual to a certain disease, and altering the diet of the individual so as to affect an improvement in the progression of the disease.

11. A method for classifying a subject diagnosed with a disease so as to select appropriate drug(s) or dietary treatment(s) for treating the disease, the method comprising: screening an individual for the presence polynucleotides identified by the method of claim 1, wherein the presence of various nucleotides corresponds to a particular classification.

12. A method for formulating a food comprising: screening an in-bred population using the method of claim 1, determining the presence of one or more diet-regulated disease-associated genes in the population, determining which dietary elements are associated with altered activity of the genes, and formulating a food so as to appropriately alter the amount of the dietary elements in the food.

13. A food formulated using the method of claim 12.

14. An array comprising a plurality of nucleotide probes, wherein at least one nucleotide probe corresponds to a diet-regulated disease-associated gene identified by the method of claim 1.

15. The array of claim 13 comprising at least two nucleotide probes identified by the method of claim 1.

16. A method for identifying diet-regulated disease-associated polynucleotides, the method comprising the following steps:

a) comparing gene expression between two inbred strains in response to different diets, wherein one inbred strain is susceptible to a disease and the other inbred strain is not susceptible to the disease,

b) identifying those differentially expressed polynucleotides that overlap with independently-derived diet-regulated QTLs, and

c) analyzing the data to identify diet-regulated disease-associated polynucleotides.